Summer 2013

Implementing a Green Economy in Least-Developed Countries The Challenges of Intellectual Property Rights and Technology Transfers within the TRIPS Agreement

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Case Studies: Ethiopia & Uganda

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Summer 2013

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Acknowledgments

I would like to thank all of the experts who took the time out of their busy schedules to allow me to interview and discuss this pressing issue with them, specifically, Ronal Gainza-Carmenates and Mamadou Diakhité of UNEP, and Jo Butler, Henrique Pacini, and Maria Bovey, of UNCTAD. These professionals provided me with a clearer vision of the issues surrounding green economy development in the least developed countries. Through conversation they were able to deliver useful information and provide a direction for my research. I appreciate their help and efforts to further assist me by directing me to multiple experts, organizations, and sources. I could not have written this paper without Celine who provided me with a comfortable place to rest and work throughout my stay in Switzerland. I would also like to thank SIT along with Gyula Csurgai, Alexandre Lambert, and Aline Dunant for allowing me to partake in this wonderful opportunity to explore my interests as well as a new country. My host sisters, Gianna and Stéphanie, deserve a big thank you for helping me with my French. I also thank my SIT friend Yan Yan for always eating chocolate with me as a much needed research break. Last, but not least, I want to thank my family in the United States for their love, encouragement and for supporting my intellectual passions even if it means a trip abroad to study in Geneva, Switzerland!

Abstract

The world has come to a stage where technology is the crux of development and growth. Vast technological advances allow for opportunities to produce at rates more efficient than even the most prodigal of scientists could have imagined. As the world simultaneously experiences development and growth, there is an unfortunate environmental tradeoff. The same industries that lead to economic advancement are causing extreme environmental degradation and least developed countries are the ones to bear the burden.

LDCs are dependent upon natural capital as their economic survival base. If the world continues to develop without considering the detrimental impacts on LDCs, business as usual will lead to extreme environmental repercussions. The planet has reached a bio-physical tipping point; environmental degradation threatens to undermine the collective well-being of all citizens.[1] New pathways for creating prosperity within a resource-constrained world are required, and developed nations have the capacity to create technology to increase sustainable development. Conversely, LDCs lack the capacity and skills to innovate and use such technology in a rural environment. The solution to this technology gap and the problem of sustainable growth seems simple. If the North possesses what the South lacks, then technology transfer is the answer.

Yet, these TTs do not occur at a rate necessary to maintain sustainable development. In a world where the occurrence of natural disasters can affect the well-being of citizens on the opposite side of the globe, it becomes a moral obligation of developed nations to aid LDCs. The argument posed by many developed countries is that it is not in their interest to give aid to nations that will not use it effectively. If LDCs cannot use the transferred commodity to the liking of the developed country, then it is their responsibility to instill capacity building programs to increase the skills and knowledge of LDC inhabitants in order to effectively use technologies that will save the environment.

Of the 48 LDCs, 34 have chosen membership in the WTO.[2] This shows progress towards global interdependence. Countries can no longer act as separate entities. Every action taken by one nation affects citizens of another. As countries are beginning to realize they have a responsibility to aid LDCs with TTs for sustainable development, there emerges another obstacle—intellectual property. Intellectual property rights (IPRs) give creators exclusive rights over the innovation for a distinct period of time.[3] As of January 1, 1995, the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) came into effect. The agreement provides minimum standards for IPRs and applies to all members of the WTO.

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[1] Gainza-Carmenates, Ronal, and Simon Lobach. "Presentation_IEH_GEN_2013_RONAL_SIMON.pptx." *Green Economy*. United Nations Environment Programme, n.d. Web. 1 July 2013. <www.unep.org/greeneconomy/>.
[2] "WORLD TRADE ORGANIZATION." *WTO*. World Trade Organization, n.d. Web. 12 July 2013. <http://www.wto.org/english/thewto_e/whatis_e/tif_e/org7_e.htm>.
[3] "WORLD TRADE ORGANIZATION." *WTO*. N.p., n.d. Web. 12 July 2013. <http://www.wto.org/english/tratop_e/trips_e/intel1_e.htm>.

The TRIPS Agreement was created to protect the IP of countries and to eventually establish effective competition and production. However, there are a few downfalls in regards to LDCs. Again, developed nations do not have an interest in transferring technology where it is likely to fail, and due to new IP laws in the TRIPS agreement, LDCs are not able to imitate developed country technology without access to it. The TRIPS Agreement could lead to higher protectionism among developed nations, whereas market liberalization toward LDCs would help catalyze growth for sustainable living. TRIPS negotiators do recognize the issues with IPRs and LDCs and integrate an extended transition phase for LDCs to adapt to the TRIPS policies.

This paper analyzes sustainable development and the challenges respecting IPRs within technology transfers. Case studies of Ethiopia (applying for membership to WTO-TRIPS) and Uganda (a current member) demonstrate the multifaceted nature of the TRIPS Agreement and the tailored aspects of technology transfers to different LDCs.

Preface

My inspiration for writing this paper was spurred by my interest in the developing world. Oftentimes, developing countries are overlooked by the global community due to their deficient capacity in conjunction with a lack of human and intellectual capital. Environmental degradation is a pertinent issue for our world, and it is my belief that we must begin combatting this crisis in the developing world.

The poorest countries are not the ones who caused the environmental crisis, but they are experiencing a stronger detrimental impact in comparison to the developed world. Consequent of their dependence on natural capital and the rapid depletion of resources created by developed countries' production, the developing world, specifically LDCs, cannot grow their economy and they certainly cannot develop within a sustainable context without help from developed nations.

This paper is a call to action for the developed world. Globalization and the evolving trend of interdependence indicate that it is in the best interest of developed countries to invest in the developing world in order to promote sustainable development. The best method of doing so is via technology transfers and training programs for citizens to use the newly transferred technology. However, intellectual property rights within the TRIPS Agreement can act as a hindrance to the flow of TTs to LDCs and increase the already difficult task of sustainable growth and development. All nations must realize that the environmental crisis is not going to disappear, it is only going to get worse; it is the responsibility of developed nations to take the necessary actions in lieu of protectionist policies and disseminate green technology to LDCs.

Theoretical Framework of Analysis

This research paper examines the issues of sustainable development in LDCs regarding IPRs in the TRIPS Agreement. Given the present environmental crisis, this research concentrates on how to best combat this crisis beginning with LDCs who are the most dependent upon natural resources. This paper analyzes the various aspects of the TRIPS Agreement and the ways in which it is both beneficial and detrimental to LDCs. To apply the research to real world scenarios two case studies were conducted. The paper focuses on Uganda and Ethiopia and the ways in which they function within the TRIPS Agreement in relation to green technology transfers. After analyzing the flaws embedded in the TRIPS Agreement that act as barriers to successful transfer of green technology, the paper concludes with a few policy suggestions to encourage more effective dissemination of green technology. The research conducted compliments existing works on this topic through the acknowledgement of both sides to the IPR argument. IPRs can be helpful to development promotion if implemented correctly, otherwise IP laws construct barriers to trade and prevent LDCs from attaining green economic growth.

Research Methodology

The primary sources of information come from interactive research hours spent interviewing various experts. The interviews and discussions provided unique perspectives on IPRs and their relationship to development. The information relayed by these experts and their suggestions of reading materials set the framework for this paper. Information from lectures at UNEP and UNCTAD are also incorporated in this paper. Additionally, WTO, UNCTAD, WIPO, UNEP, and ICTSD materials were extremely helpful in attaining a better understanding of IPRs, TTs, and the TRIPS Agreement. The newest LDC Report 2012 (UNCTAD) and Green Economy and Trade Report 2013 (UNEP) contain vital information used throughout this paper along with various reports on the economy and development discovered online.

Acronyms

BES	Berkeley-Ethiopia Stove
CDP	Committee for Development Policy
DFID	Department for International Development
EST	Environmentally Sound Technology
FDI	Foreign Direct Investment
GNI	Gross National Income
HAI	Human Asset Index
ICTSD	International Centre for Trade and Sustainable Development
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual Property Rights
LBL	Lawrence Berkeley National Laboratory
LDC	Least Developed Country
NGO	Non-Governmental Organization
PPP	Public-Private Partnership
R&D	Research and Development
SSFA	Small Scale Funding Agreement
TRIPS	Agreement on Trade Related Aspects of Intellectual Property Rights
TT	Technology Transfer
TTO	Technology Transfer Office
UNEP	United Nations Environment Program
UTIP	Uganda Trade and Intellectual Property Program
WFP	World Food Program
WTO	World Trade Organization

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Introduction

"We, the heads of State and Government and high level representatives…renew our commitment to sustainable development, and to ensure the promotion of economically, socially and environmentally sustainable future for our planet and for present and future generations."

-Rio+20 Sustainable Development Summit
Rio de Janeiro, Brazil

The Rio Earth Summit is a turning point for the green growth agenda. The heads of State of the United Nations made a vital commitment to recognize climate change as what may arguably be defined as the most pressing issue of present. The acknowledgement by each country is significant; the world faces an environmental crisis, and in a realm of global interdependence no nation remains immune to the detrimental effects of environmental degradation.

In the ongoing battle to curb greenhouse gas emissions and reduce consumption of natural resources, environmentally sound technologies (ESTs) are in the cross hairs. As industries increase their growth and development, the environmental sustainability inversely decreases. ESTs are the tool necessary to promote growth while simultaneously maintaining a sustainable level of production for the protection of the environment.

Access to ESTs typically occurs via technology transfers (TTs) from the developed to the developing world. Developed countries have the resources to create technology for increasing sustainable development and are beginning to employ these technologies in their production institutions. Least developed countries (LDCs) are regions most dependent upon natural capital—accounting for 26% of their wealth creation.[4] LDCs require ESTs to encourage development, yet they lack the necessary resources for such a technology. The solution seems

[4] Gainza-Carmenates, Ronal, and Simon Lobach. "Presentation_IEH_GEN_2013_RONAL_SIMON.pptx." *Green Economy*. United Nations Environment Programme, n.d. Web. 1 July 2013. <www.unep.org/greeneconomy/>.

simple: developed countries transfer their technology to LDCs and enable environmentally safe production while decreasing the technology gap.

However, these TTs to LDCs rarely occur due to deficient developed nation incentive to transfer ESTs to countries that lack the capacity to effectively implement green technology. Additional obstacles for LDCs acquirement of ESTs present themselves in the form of intellectual property rights (IPRs). IPRs function to protect the intellectual technology of their creators. IP laws oftentimes create barriers to transfers consequent of patent laws and high transaction costs. The 1995 Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) was constructed to protect the IP of countries while promoting effective competition and production among all member countries[5].

Every country in the World Trade Organization (WTO) is an agreeing member to the TRIPS Agreement. Currently 48 nations are defined as LDCs and of those, 34 are WTO-TRIPS members. Not only is the world globalizing, but this agreement also demonstrates the progress made toward an interdependent world. It is no longer feasible for countries to act as separate entities. The TRIPS Agreement attempts to relay this notion to the developed world by incorporating rules for governments to incentivize firms to engage in TTs with LDCs.

Incentives for developing nations remain in short supply; this poses an issue for LDCs that can no longer imitate technology through reverse engineering due to strict patent laws stipulated in the TRIPS Agreement. The only remaining path for sustainable development toward a green economy is TT.

[5] "WORLD TRADE ORGANIZATION." *WTO*. N.p., n.d. Web. 12 July 2013. <http://www.wto.org/english/tratop_e/trips_e/intel1_e.htm>.

Although the TRIPS Agreement does consider issues concerning IPRs and LDCs through an extended transition phase for LDCs to adapt to TRIPS policies along with the aforementioned incentives clause, the first step toward achieving a global green economy must come from developed countries. It is up to the developed world to recognize that the burden of environmental degradation is on their shoulders and the only means of alleviation are TTs to LDCs. By analyzing case studies of Ethiopia and Uganda, the purpose is to demonstrate the complex nature of IP and its effect on TTs to LDCs and the environment. Sustainable development is possible, but motivation, capacity, commitment, and most importantly, coordination between the developed and developing world is necessary to achieve the ultimate goal of both economic growth and environmental protection.

Defining a Least Developed Country

Least developed countries and developing countries are not one in the same; they are two uniquely separate categories. Although there is no formal definition for developing countries, all nations of this category enjoy special provisions in treaties and agreements that allow their characteristically slower economies to adapt to new policies. With over 190 countries in the world, 48 are considered to be LDCs.[6] The Committee for Development Policy (CDP) defines LDCs as "low-income countries suffering from the most severe structural impediments to sustainable development."[7]

LDCs must meet three requirements of low-income, human resource weakness, and economic vulnerability. Low-income status is based upon the gross national income (GNI) per capita. It is an estimate averaged over three years and must be under $750 or the current average

[6] UNCTAD. *The Least Developed Countries Report 2012*. Rep. Geneva: United Nations, n.d. Print.
[7] Committee for Development Policy. "UN DESA | DPAD | CDP | Least Developed Countries Criteria." *UN News Center*. UN, Sept. 2011. Web. 12 July 2013. <http://www.un.org/en/development/desa/policy/cdp/ldc/ldc_criteria.shtml>.

level of GNI per capita as determined by the World Bank.[8] Human resource weakness is calculated through the Human Assets Index (HAI) and measures the percentage of the population that is undernourished, mortality rate of children under five years of age, gross secondary school enrollment ratio, and the adult literacy rate.[9] The four indicators are given index numbers and averaged. A country's average must fall below the threshold to meet the standards of a LDC (if 60 countries are in the reference group, 45 countries will fall below the threshold). LDCs must also meet the economic vulnerability criterion based on eight categories of an exposure and shock index: instability of agricultural production, instability of exports of goods and services, remoteness, merchandise export concentration, share of agriculture, forestry, and fisheries, victims of natural disasters, share of population in low elevated coastal zones, and population. The indicators measure the country's level of resilience when faced with an exogenous shock. The population may not exceed 75 million to be considered for LDC status.[10] To officially be deemed a LDC, countries must meet all of the aforementioned criteria.

The Green Economy & Technology Transfers

According to UNEP's Green Economy Initiative, a Green Economy is defined as one "that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities." A successful green economy is one that is low carbon, resource efficient, and socially inclusive.[11] As the developed world and emerging economies of developing countries are experiencing rapid growth, the sustainability of the

[8] "___ Least Developed Countries (LDCs)." *List of Least Developed Countries*. Nations Online, n.d. Web. 12 July 2013. <http://www.nationsonline.org/oneworld/least_developed_countries.htm>.
[9] Committee for Development Policy. "UN DESA | DPAD | CDP | Least Developed Countries Criteria." *UN News Center*. UN, Sept. 2011. Web. 12 July 2013. <http://www.un.org/en/development/desa/policy/cdp/ldc/ldc_criteria.shtml>.
[10] Ibid.
[11] "United Nations Environment Programme." *UNEP Green Economy*. UNEP, n.d. Web. 1 July 2013. <http://www.unep.org/greeneconomy/AboutGEI/WhatisGEI/tabid/29784/Default.aspx>.

environment is quickly declining. Globally, we are reaching a bio-physical tipping point that will soon undermine the well-being of citizens worldwide. In terms of rate of biodiversity loss, human interference with the nitrogen cycle, and climate change, we have far exceeded the proposed limits of safe operation.[12] Continuing production under "business as usual" is not feasible. LDCs depend upon natural resources for their livelihood and due to their lack of capacity for innovation, developed countries must fulfill their role in aiding LDCs to achieve sustainable development—this must become their priority before it is too late.[13]

In an age where development is increasingly measured by technological capabilities, the role of TTs from the developed world to LDCs is crucial for sustainable development. UNEP views a green economy as "not so much a question of innovation at the technological frontier but rather one of technology transfer and diffusion."[14] The IPCC defines technology transfer as:

> a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/educational institutions.[15]

The ICTSD recognizes additional forms of technology transfers such as "market-based forms of TT" and "non-market-based forms of TT". The former includes foreign direct investment, licensing, and technologies embedded in imported goods, whereas the latter encompasses technical knowledge spillovers such as imitation, reverse engineering, mobilization of workers and students, and learning from filed patents of foreign investors and scientific publications.

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[12] Gainza-Carmenates, Ronal, and Simon Lobach. "Presentation_IEH_GEN_2013_RONAL_SIMON.pptx." *Green Economy*. United Nations Environment Programme, n.d. Web. 1 July 2013. <www.unep.org/greeneconomy/>.
[13] Diakhite, Mamadou. Personal Interview. 3 July 2013.
[14] Swanson, Timothy, and Zacharias Ziegelhofer. *Economic Frameworks for Thinking about Growth, Sustainability, and the Role of State Intervention: Paths to Green Economies*. Working paper. N.p.: United Nations Environment Programme, 2011. Print.
[15] Seres, Stephen, Erik Haites, and Kevin Murphy. "The Contribution of the Clean Development Mechanism Under the Kyoto Protocol to Technology Transfer." UNFCCC, 2010. Web. 8 July 2013. <http://cdm.unfccc.int/Reference/Reports/TTreport/TTrep10.pdf>.

However, as technology becomes increasingly complicated, the ability of developing countries to use non-market strategies to absorb innovative technical knowledge and apply it to their own economic sectors is disappearing.

Consequently, LDCs must approach technology transfers via the "market-based route" and engage in diplomatic relations with developed countries to obtain these much needed technologies. Implementing a green economy in LDCs is analogous to creating sustainable development. This process can alleviate poverty, increase food security, decrease disease, and increase employment. In order to improve these sectors LDCs need effective technology transfers that include capacity building programs to ensure long term growth. The TRIPS Agreement created by the WTO raises issues for TTs to LDCs according to new IP standards.

The TRIPS Agreement

The TRIPS Agreement is "the most comprehensive multilateral agreement on intellectual property."[16] This Agreement constructed by the WTO in 1995 following the Uruguay Round of Trade Negotiations, stipulates that in addition to following the regulations of the Paris and Berne Conventions, members must also agree to follow minimum standards of protection in regards to creations of the mind.[17] The preamble of the TRIPS Agreement states the objective to:

> reduce distortions and impediments to international trade, and taking into account the need to promote effective and adequate protection of intellectual property rights, and to ensure that measures and procedures to enforce intellectual property rights do not themselves become barriers to legitimate trade.[18]

Despite the explicit statement to avoid "barriers to legitimate trade" LDCs fear the involvement of IP and WIPO under the perception that they mainly coordinate with private sector clientele

[16] TRIPS : A More Detailed Overview of the TRIPS Agreement." *World Trade Organization*. N.p., 2013. Web. 9 July 2013. <http://www.wto.org/english/tratop_e/trips_e/intel2_e.htm>.
[17] "WTO | Intellectual Property (TRIPS) - Agreement Text - General Provisions." *World Trade Organization*. N.p., n.d. Web. 11 July 2013. <http://www.wto.org/english/tratop_e/trips_e/t_agm2_e.htm>.
[18] Ibid.

and create IP policies based upon a "protectionist agenda of corporate interests."[19] LDCs are large net importers of technology from the North. With the developed world's vast industries, they are likely to benefit from IPR systems to protect new innovations. However, LDCs with weak technological capacity will gain little benefit from IP protection. By strengthening the conditions for IP protection, developing nations can no longer compete by importing advanced technology and reproducing behind tariff barriers.

Decreasing Competition

In light of the TRIPS Agreement, companies are "more wary of transferring technology in ways that may increase the competition they face."[20] Article 40 of TRIPS states that licensing practices pertaining to IPR which "restrain competition may have adverse effects on trade and may impede the transfer and dissemination of technology."[21] Competition is the groundwork for a successful economic system; it provides an incentive to produce and increase efficiency. Again, with increasing IP laws and standards, LDCs will not have access to "mature" technology and will not be able to compete in the global market. The lack of accessible green technology such as water conservation, hydroelectric energy, solar panels, and agricultural commodities will leave LDCs with no choice but to continue production with their current technology that contributes to pollution, soil erosion, and water depletion among other environmentally degrading practices.

The Patent Problem

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[19] "Intellectual Property - Knowledge Creation or Protectionist Agenda?" *NW Resistance Against Genetic Engineering*. Third World Network, n.d. Web. 9 July 2013. <http://www.nwrage.org/content/intellectual-property-knowledge-creation-or-protectionist-agenda>.

[20] "Report on the Commission on Intellectual Property Rights." *Integrating Intellectual Property Rights and Development Policy*. Commission on Intellectual Property Rights, Sept. 2002. Web. 12 July 2013. <http://www.iprcommission.org>.

[21] "Part II - Standards Concerning the Availability, Scope and Use of Intellectual Property Rights." *Uruguay Round Agreement: TRIPS*. World Trade Organization, n.d. Web. 11 July 2013. <http://www.wto.org/english/docs_e/legal_e/27-trips_04d_e.htm>.

The main elements of protection in the TRIPS Agreement are defined by the subject matter to be protected along with the rights, exceptions, and the duration of protection. Under the TRIPS Agreement, patents are to be available to all members without discrimination. Countries that obtain patents are given "exclusive rights….of making, using, offering for sale, selling, and importing…patent owners shall also have the right to assign or transfer by succession, the patent and to conclude licensing contracts."[22] The aforementioned conferred rights, as specified in Article 28, imply that nations creating patents under this agreement obtain a power position over developing countries. TRIPS gives technologically-capable countries the authority to decide where to transfer technology which creates obstacles for developing countries that lack promising market prospects and the skills to effectively absorb mature technology. This leads to a failure of the TRIPS that is contradictory to the statements made in Article 7:

> the protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge in a manner conducive to social and economic welfare, and to balance of rights and obligations.[23]

Developed nations will not want to distribute patent licenses to regions where the technology will likely fail. However, when it comes to TTs, LDCs must be taken into consideration. Oftentimes, developed countries overlook LDCs because they lack the basic "financial, managerial and technical capabilities necessary to incorporate new technologies and innovate."[24]If developed nations retain this mindset, the technology gap among the developed and developing world will continue to grow. To combat the increasing gap, the TRIPS

[22] Ibid.
[23] Ibid
[24] Correa, Carlos. "Intellectual Property in LDCs: Strategies for Enhancing Technology Transfer and Dissemination." *UNCTAD The Least Developed Countries Report 2007 Background Paper*. UNCTAD, n.d. Web. 11 July 2013. <http://unctad.org/Sections/ldc_dir/docs/ldcr2007_Correa_en.pdf>.

Agreement encourages developed nations to provide incentives for enterprises to transfer technology to the Global South.

The Patent Solution

The TRIPS Agreement acknowledges the challenges of licensing patents to other regions in Article 31. The article discusses how applications are to be "considered on its individual merits."[25] To elaborate, the statement indicates that authorities cannot decide to license patents, say for renewable energies, without considering applications based upon the assets of the recipient. This portion of the TRIPS Agreement addresses the issue of implementing advanced approaches for sustainable development in LDCs. In these least developed countries the common trend is micro-enterprise firms that use the mature technology transferred to them without undertaking efforts to innovate, which further weakens the firms' capacity. Through Article 31, developed countries are encouraged to analyze the unique characteristics of prospective technology recipients and decide if a technology should be transferred and how to effectively implement sustainable development in a specific LDC. As there are exceptions to every rule, a license can be given without an application (compulsory license) if a national emergency occurs such as a disease outbreak, in cases of public non-commercial use, and as a remedy for cases of anti-competitive practices.[26]

Advisory Services

UNEP engages in advisory services for developing countries to discover their development needs and the best methods for improvement. UNEP Green Economy Advisory

[25] "WTO | Intellectual Property (TRIPS) - Agreement Text - General Provisions." *World Trade Organization*. N.p., n.d. Web. 11 July 2013. <http://www.wto.org/english/tratop_e/trips_e/t_agm2_e.htm>.
[26] "WTO | Intellectual Property (TRIPS) - Agreement Text - General Provisions." *World Trade Organization*. N.p., n.d. Web. 11 July 2013. <http://www.wto.org/english/tratop_e/trips_e/t_agm2_e.htm>.

Services consist of "policy advice, technical assistance and capacity building that are provided to governments in support of their national and regional initiatives to transform and revitalize their economies."[27] By assuming a grassroots approach to development, UNEP is working at the local level to determine a region's specific needs and works to build capacity by enhancing local knowledge of how to "green" a particular sector. UNEP focuses on six different "greening" sectors: agriculture, fisheries and aquaculture, forestry, manufacturing, renewable energy, and tourism.[28]

Advisory Service specialist, Mamadou Diakhite, describes the extensive field researched involved in determining which sector to focus on improving. Typically, it takes 2-3 years to define the appropriate sector. The advisory team then prioritizes the different sectors and ranks their importance all while directly coordinating with the country of intervention. UNEP then creates a Small Scale Funding Agreement (SSFA) and launches a workshop about the processes involved in implementing a green economy in another country.[29] UNEP experts collaborate with technicians in the targeted country as well as the country's government to account for what they consider to be a priority sector. Then, work with modeling institutions begins in order to build possible scenarios for development plans.

For long term growth of implemented policies, there must be mutual commitment between the advisory service actors and the country of intervention. The developing nation must take ownership of the policies and seek to enforce them while advisory services must oversee the project to increase prospects of success. Oftentimes developed countries fail to see the incentive

[27] UNEP. "Advisory Services." *Advisory Services*. United Nations Environment Programme, n.d. Web. 16 July 2013. <http://www.unep.org/greeneconomy/AdvisoryServices/tabid/4603/language/en-US/Default.aspx>.
[28] Ibid
[29] Diakhite, Mamadou. Personal Interview. 3 July 2013.

of a greener world through TTs to LDCs and therefore do not transfer green commodities to the developing world. UNEP fills this void and plays a key role in implementing effective TTs to developing nations through their advisory services.

Incentives for TTs to LDCs

Article 66 of TRIPS states that developed country members shall:

> provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfers to least-developed country Members in order to enable them to create a sound and viable technological base."[30]

To facilitate these incentives, Article 67 discusses the specifics of technical cooperation among the developed world and LDCs such as assistance in the preparation of laws and regulations on the protection and enforcement of IPRs as well as on the prevention of their abuse. The article encourages capacity building via support in terms of the establishment or reinforcement of domestic offices and agencies relevant to matters including the training of personnel.

Despite the effort made by the TRIPS Agreement to incentivize developed countries to help LDCs, for TTs to successfully occur, the transfer must emerge internally from developed countries. It is time for the developed world to recognize that the coming era is not one for industry-protection and self-interest. The world is increasingly interdependent and with an environmental crisis on the horizon it is truly in the best interest of developed nations to aid LDCs in using sustainable development technology to curb environmental degradation and save the planet from the hazardous ramifications of climate change.

[30] "WTO | Intellectual Property (TRIPS) - Agreement Text - General Provisions." *World Trade Organization*. N.p., n.d. Web. 11 July 2013. <http://www.wto.org/english/tratop_e/trips_e/t_agm2_e.htm>.

LDC Preferential Treatment under TRIPS

Although it may seem as though the TRIPS Agreement is biased against LDCs despite the incentive provision, there are benefits conferred to developing countries.

> In view of the special needs and requirements of least-developed country Members, their economic, financial and administrative constraints, and their need for flexibility to create a viable technological base, such Members shall not be required to apply the provisions of this Agreement, other than Articles 3, 4 and 5, for a period of 10 years from the date of application as defined under paragraph 1 of Article 65. The Council for TRIPS shall, upon duly motivated request by a least-developed country Member, accord extensions of this period.[31]

This passage of the TRIPS agreement allows LDCs a grace period until 2013 with the possibility to request a further extension to 2016. The additional time allows LDCs to adapt to the agreement at their own pace while simultaneously allowing them the necessary policy space needed for development.

Ethiopia

This African country, located in the continent's Horn, is currently undergoing the process of accession to the WTO and is expected to finalize the process in 2015.[32] Although Ethiopia is not yet member to the WTO, the nation is still affected by IP systems as shown in the following case study investigating the implementation of cookstoves.

As this paper demonstrates, sustainable TTs are essential to achieving a green economy in LDCs. In Ethiopia, women were accustomed to cooking on extremely inefficient three-stone fires which burn exorbitant amounts of fuelwood contributing to air pollution—detrimental to

[31] "WTO | Intellectual Property (TRIPS) - Agreement Text - General Provisions." *World Trade Organization*. N.p., n.d. Web. 11 July 2013. <http://www.wto.org/english/tratop_e/trips_e/t_agm2_e.htm>.
[32] "Accession Status: Ethiopia." *World Trade Organization*. WTO, n.d. Web. 13 July 2013. <http://www.wto.org/english/thewto_e/acc_e/a1_ethiopia_e.htm>.

both the environment and human health. The proposed solution was the modification of a stove used in Darfur to meet the unique needs of Ethiopia.[33]

After extensive R&D, multiple trial models, and funding from the U.S. Department of Energy, the Lawrence Berkeley National Laboratory (LBL) created the Berkeley-Ethiopia Stove (BES). However, because of Sudan and Ethiopia's lack of representation in the TRIPS Agreement, the Technology Transfer Office (TTO) hesitated to patent the original Berkely-Darfur Stove because the patent would "likely not be enforceable and, thus, not confer any benefit."[34] Without an IP system, patent grants are not easily accessible. Innovator of the BES, Dr. Gadgil, convinced the TTO to patent the stove because of the vast amount of African people that would benefit from its use. With as many as 70 million people using the stove, his hope was that it would attract commercial interest of a company to invest in the product.[35]

Another reason for patent protection was the risk of knock-off stoves of inferior quality. If other countries attempted to imitate the stove through this non-market channel of technology transfer, both economic and social well-being would be at risk. With design modifications of even a centimeter, the stove would be "less efficient, short-lived, [and] a safety risk."[36] Additionally, stove imitations would likely be sold at cheaper prices to attract buyers; this would drive the quality stoves out of the market and damage the name of the design worldwide.

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[33] Booker, Kayje M., Ashok J. Gadgil, and David Winickoff. "Engineering for the Global Poor: The Role of Intellectual Property." *Ernest Orlando Lawrence Berkeley National Laboratory*. LBL, July 2012. Web. 13 July 2013. <http://eetd.lbl.gov/sites/all/files/lbnl-5950e-engineering_for_the_global_poor.pdf>.
[34] Booker, Kayje M., Ashok J. Gadgil, and David Winickoff. "Engineering for the Global Poor: The Role of Intellectual Property." *Ernest Orlando Lawrence Berkeley National Laboratory*. LBL, July 2012. Web. 13 July 2013. <http://eetd.lbl.gov/sites/all/files/lbnl-5950e-engineering_for_the_global_poor.pdf>.
[35] Ibid.
[36] Ibid.

Initially, private investors were not interested in such mundane technologies or what is described as "technology for the poor."[37] However, as a new carbon market began to emerge, companies viewed the cost-effective carbon emissions reductions generated by the reduced fuel use of the stove as a means of profit. Following this investment discovery, the TTO filed a patent for the stove in the interest of carbon companies that would require IP protection as a condition for their investment in this new stove technology.

The first organization to officially show interest in the stove was World Vision. The NGO approached Gadgil about implementing the technology in Ethiopia to 100,000 homes.[38] Once again, the issue of an IP system as delegated by TRIPS caused a lengthy process of red tape. The two entities were required to sign an agreement that negotiated terms of the license and liability. After five months of discussion both parties could not reach a consensus thus, no agreement was reached and no formal license was granted. In order to move forward with the project, LBL signed a "nonassert" or a covenant that permits third parties to practice a patent they would otherwise infringe.[39] World Vision and LBL used the nonassert to grant themselves liability protection while still enabling Ethiopia to receive the stove technology.

Uganda

An example of a successful TT for LDCs takes place in Uganda. This landlocked country of East Africa supports 80% of its work force through agriculture.[40] After cotton was seen as a potential cash crop for production, it was introduced to Uganda in 1903 through the

[37] Ibid.
[38] Ibid.
[39] Ibid
[40] Selleyfan, Kristin. "Uganda: Branding Cotton, Sesame and Vanilla." *WIPO Magazine*. WIPO, June 2012. Web. 14 July 2013. <http://www.wipo.int/wipo_magazine/en/2012/03/article_0002.html>.

establishment of the Uganda Company by the English industrial missionary, K. Borup and the British Cotton Growing Association.[41]

The history of Uganda shows the decline of soil fertility due to excessive harvesting and lack of access to agricultural improvements. For a population dependent upon agriculture, the repercussions of soil erosion are calamitous. The main reason for decreased soil fertility was the low use of fertilizers: "smallholder farmers use less than 1kg/ha of inorganic fertilizers while only 10% apply pesticides."[42] The poor input marketing system in Uganda caused the low use of external inputs for agricultural production. Fortunately, with the help of NGOs and donor countries, Uganda was able to use lack of fertilizer to their advantage and now pursues organic agricultural production.

The global market for organic goods is estimated at $50 billion USD.[43] This is optimal for LDCs because it provides opportunities for exporting to OCED countries that generate 97 percent of the revenues for developing countries. Following the introduction of cotton, Uganda has seen vast improvements among the economic, social, and environmental sectors of development. Uganda benefits from massive export earnings from OECD investors. Studies conducted by UNEP and UNCTAD show that exports increased from $6.2 million USD in 2004/5 to $22.8 million USD in 2007/8.[44] The economic successes in Uganda will allow for a higher standard of living, increased job opportunities, and increased food quality which will promote health and eradicate poverty. Additionally, UNEP reports that organic agriculture

[41] Jørgensen, Jan Jelmert. "Transformation into Dependence." *Uganda: A Modern History*. New York: St. Martin's, 1981. 53-54. Print.
[42] Nkonya, Ephraim, and Edward Kato. *Agricultural Input Marketing in Uganda*. Rep. Kampala: International Food Policy Research Institute, 2001. Print.
[43] "Success Stories: Organic Agriculture in Uganda." *Green Economy*. United Nations Environment Programme, n.d. Web. 9 July 2013.
[44] Ibid.

contributes to mitigating climate change via GHG emissions that are 64% lower than emissions on conventional farms.[45]

Donor countries are furthering the success of LDCs like Uganda through programs such as USAID that plans to contribute $7.9 million USD toward agriculture and market access activities of the UN World Food Programme (WFP). This program is run in "collaboration with the Government of Uganda, commercial banks, the private sector, the UN's Food and Agriculture Organization, and the Uganda Commodity Exchange, among other entities."[46] This multi-actor coordination is extremely important to ensure the effectiveness of the project. Given a successful USAID program, this investment will further increase productivity, efficiency, and boost incomes of smallholder farmers in Uganda.

As a LDC member of the WTO, Uganda receives preferential treatment offered to developing nations. In addition to the time extension to adapt to the TRIPS Agreement standards, the TRIPS Council also calls for LDCs to provide the council with as much information on their individual priority needs of financial and technical assistance for successful implementation of TRIPS Agreement policies. As aforementioned, the TRIPS Agreement stipulates that developed-country WTO members have "an obligation to provide technical and financial assistance to Uganda and other developing countries for implementing the TRIPS Agreement."[47] To meet the needs assessment work of TRIPS, Uganda created a national capacity building program—Uganda Trade and Intellectual Property Program (UTIP). With the help of DFID, WIPO, USAID, and ICTSD among other organizations, the goal of UTIP is to improve administration

[45] Ibid.
[46] "U.S. Contributes $7.9 Million to the UN World Food Program's Agriculture and Market Access Programs." *USAID/Uganda*. N.p., n.d. Web. 14 July 2013. <http://uganda.usaid.gov/node/115>.
[47] "Least Developed Countries' Priority Needs in Intellectual Property." *World Trade Organization*. WTO, May 2008. Web. 10 July 2013. <http://www.wto.org/english/tratop_e/trips_e/ldc_e.htm>.

services for IPRs available for enterprises and inventors in Uganda, increase awareness and use of IP as a tool for economic development, and increase capacities for effective and efficient enforcement of IPRs along with IP education, training and research institutions.[48]

Comparing Ethiopia & Uganda

It is interesting to observe the differences in regards to TTs, IPRs and their effect on the green economy when looking at one LDC as a member of the WTO and TRIPS (Uganda), and one that is still undergoing the accession process (Ethiopia). It is clear that IPRs have both advantages and disadvantages when it comes to promoting TTs, and the TRIPS Agreement demonstrates this.

In the case of Ethiopia, lack of IP protection hindered its growth process. Contributors to the resource efficient stove invention, LBL and TTO, were skeptical about patenting and disseminating the technology because Ethiopia had no real means of IP protection. As a non-member to the WTO, the TRIPS standards do not apply to the country and the stove innovators feared that their invention would not receive the proper protection. Without this essential TT, Ethiopia would still be cooking on a three-stone fire and polluting the environment. It was only through the persuasive arguments of Dr. Gadgil that Ethiopia was able to receive this TT and improve their means of cooking which consequently decreased pollution, deforestation, and increased cost-effective carbon emissions reductions through reduced fuel use.[49]

A conversation with a Senior UNCTAD expert of the LDCs Special Programs Africa Division, revealed that implementation of new water purifying technology in LDCs was discussed with an Indian inventor. The topic of implementation in Ethiopia was raised, but the

[48] Ibid.
[49] "Success Stories: Organic Agriculture in Uganda." *Green Economy*. United Nations Environment Programme, n.d. Web. 9 July 2013.

inventor worried that the water purifying technology would not be protected as IP due to Ethiopia's lack of an IPR system within TRIPS.[50]

Although Uganda still continues to struggle with their own IP system, they receive much donor aid to assist in the process of creating a successful agenda for protection, such as UTIP, through the TRIPS Agreement. The large success of organic agriculture in Uganda is due in part to its TRIPS membership. Developed country members saw the opportunity to aid a fellow member and did not have to worry about TTs and their IP protection. However, it is to be noted that developed countries sought self-interest in the matter of helping Uganda. It was only after Uganda suffered lack of fertilizer from more mature nations that they switched to organic agriculture, and it was only after a market for organic goods emerged that the developed world began to invest and import these goods from Uganda.

After examining Ethiopia and Uganda in regards to TTs and IPRs, it is clear that there are still flaws in the IP system. The TRIPS Agreement can protect IP from improper replication, in the stove scenario, but it can also prevent LDCs from obtaining green technologies. The TRIPS Agreement is supposed to create an incentive and moral obligation for developed nations to aid LDCs, but as the Uganda case shows, there is always self-interest involved. The TRIPS Agreement is a well-intentioned approach to successful IP systems, but there are still policy implications for further improvement.

Policy Implications

Transferring technology is a complex process, especially for LDCs. The TRIPS Agreement strives to make TTs for LDCs easier by allowing a grace period and encouraging developed countries to distribute new inventions and know-how to the developing world. LDCs

[50] Anonymous. Personal Interview. 10 July 2013.

can no longer rely on FDI and trade to access foreign technologies; the approach to TTs is in need of modification.

In order to sustain successful TTs to LDCs, developed countries need to make a green economy via TTs a number one priority, employ in-depth research for successful policies, stronger incentives, and most importantly, involve public-private partnerships (PPPs).

PPPs

The TRIPS Agreement asks developed country members to provide incentives to their enterprises to encourage TTs to LDCs, but oftentimes the governments of developed nations do not actually own the technology for transfer and cannot enforce the private sector to trade with LDCs. This is where the involvement of a third party, PPPs, plays an essential role by linking donors, private firms, and local entrepreneurial activities to ensure the effectiveness of the operation.

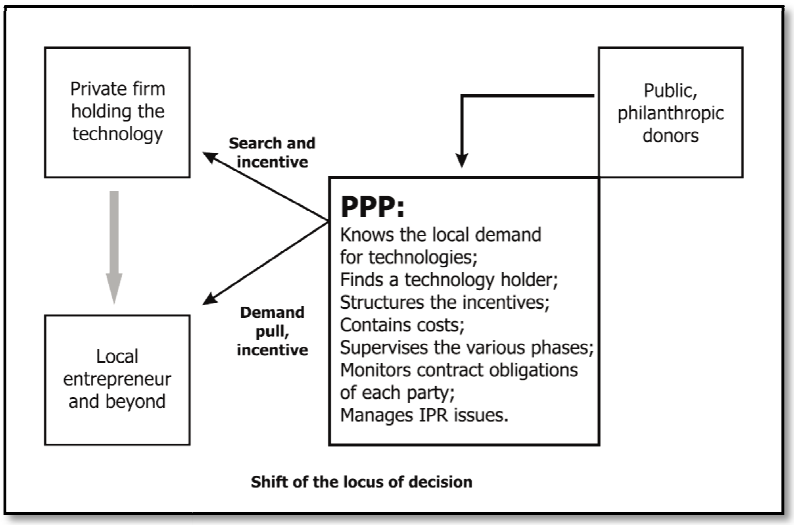
The main goal of PPPs is to shift the "locus of control" or where the main decision-making in terms of the TT takes place.[51] This locus for decision-making should not be held by foreign assistance bodies holding the technology. PPPs aim to transfer the locus to local governments to match their initiatives and entrepreneurial capability.

Using a third party entity such as a PPP is vital to successful technology implementation in LDCs because they make the TT their main focus. PPPs ensure that the entire process is demand-based, fit to local entrepreneurial need, focused on the appropriate technology partner,

[51] Foray, Dominique. *Technology Transfer in the TRIPS Age: The Need for New Types of Partnerships between the Least Developed and Most Advanced Economies*. Rep. no. 23. Geneva: International Centre for Trade and Sustainable Development (ICTSD), 2009.

creating transaction incentives, low transaction cost, in accordance with IPRs, and PPPs supervise the entire process for an effective transfer.

Role of a PPP as TT Operator[52]



To touch on IP, PPPs are useful because most institutions in developing countries lack IPR management. PPPs can clarify the role of firms in negotiating ownership of IP from the TT and aid in the process of bargaining for access to products and attaining a low transaction cost.

Research, Prioritize, Incentivize

In order to prioritize and incentivize the transfer of ESTs, investigative research needs to occur. Before a transfer takes place, technology holders must examine the local needs of LDCs and their relative capacity in order to implement ESTs in an effective way that will have positive prospects for long term growth. If the projects are designed to suit local needs they are likely to generate spillovers to be captured by the local economy. Developed countries should recognize that spillovers are more apt to occur via TTs than through FDI and knowledge obtained from the global market. The two latter methods of TT are not sufficient to develop the absorptive capacities of LDCs which are essential for sustainable growth and development.

[52] Ibid.

Green Patent Pools

The process of helping developed countries realize that local innovations in LDCs will generate a process of diffusion and information spillover among the domestic economy is not easy. However, once developed countries acknowledge the necessity of TTs to LDCs they can be further incentivized to make the process easier. One method of doing so is via green patent pools. The idea is that when a particular technology is composed of various items whose patents belong to different rights holders, the holders will pool their rights and license the use of the patented items through a single agreement.[53] Patent pools are extremely useful for producers who need to conform to an environmental standard through the use of the patented items. Without patent pools, producers are discouraged from meeting the aforementioned standards due to the multiple applications that must be filed for use of the patented items. Therefore, patent pools incentivize institutions to produce in more environmentally friendly ways through one simple application that will allow access to all patented items in the pool.

Conclusion

Global recognition of the necessity to dedicate actions to alleviate climate change through the Rio+20 Summit, is the world's first step towards a green economy and sustainable development. However, in the process of attaining greener production countries will face multiple barriers. The TRIPS Agreement operates to promote production and trade in a way that protects IP, but the protectionist policies of TRIPS are preventing LDCs from accessing green technology through TTs due to new restrictions on IP. Provisions such as an extended transition

[53] UNEP Economics and Trade Branch. *Green Economy and Trade: Trends, Challenges and Opportunities*. Rep. N.p.: United Nations Environment Programme, 2013. Print.

period for LDCs and encouraging incentives for TTs from developed countries are included in the Agreement, but there is more to be done.

The cases of Ethiopia and Uganda exhibit the challenges that persist with IPRs in the TRIPS Agreement. Ethiopia's lack of membership made the acquisition of more efficient and environmentally friendly stoves a complex process that barely came to fruition. Conversely, Uganda is a member of TRIPS yet the lack of incentives in the developed world prevented the nation from obtaining fertilizer in their input market. Lack of fertilization led to organic agriculture, but not every nation faces such a positive outcome. The TRIPS Agreement functioned in Uganda only after an organic market emerged, but the IP protection in Uganda via TRIPS allowed countries to easily transfer technology and invest in Uganda's organic farming production. Clearly the effects of IPRs on LDCs and the environment are largely debated.

The ultimate goal of IP laws in the TRIPS Agreement is to protect IP and increase efficient competition by encouraging nations to seek and develop their own technology. The TRIPS Agreement can be successful, but only if the LDCs are first given the chance to thrive in a global green economy. Developed nations did not face such protectionist policies in the past and were able to develop by reverse engineering and imitation. This luxury technological route is no longer available to LDCs, and developed nations are beginning to recognize that in order to save the world from environmental degradation they must first help their less fortunate counterparts. The moral obligation in conjunction with the fear for the well-being of mankind functions as an internal incentive to increase international technological accessibility. Before global sustainable development can truly take hold, developed countries must do their part to examine the needs of LDCs and provide the means to meet those needs. The time for action is

now; the future of the world depends upon effective coordination among LDCs and developed nations to save the planet from environmental crisis.

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